

# A Very Brief Overview of Weather Forecasting Tools

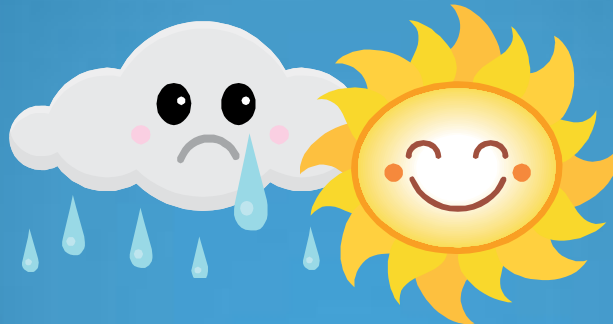
Briefing by:

Roque Vinicio Céspedes

**Finally Here!**

The MOST awaited briefing ever!

February 16, 2011



# Computer Guidance Forecast

- The National Center for Environmental Prediction (NCEP) and other agencies run computer models to forecast the weather.
- Statistical guidance is often used as a first guess for a weather forecast.
- Guidance can be decoded to provide the information necessary to make a forecast for “a point forecast” for a city.

# Model Output Statistics (MOS)

- Computer models are never perfect.
- They have systematic errors (“biases”) that depend on the place and time, and these need to be corrected.
- MOS = a blend of computer model output with historical forecast data, used to predict meteorological conditions at the surface.

# Note about NWS weather station codes...

- This is usually the same as the airport codes (usually, but not always the first three letters of a city name), prefixed by the letter “K”.
- For Miami, FL, this is “KMIA”.

# Date and Time Conversions

- Meteorological Information is given for UTC time. This is the time zone associated with the prime Meridian

- $EST = UTC - 5 \text{ Hours}$

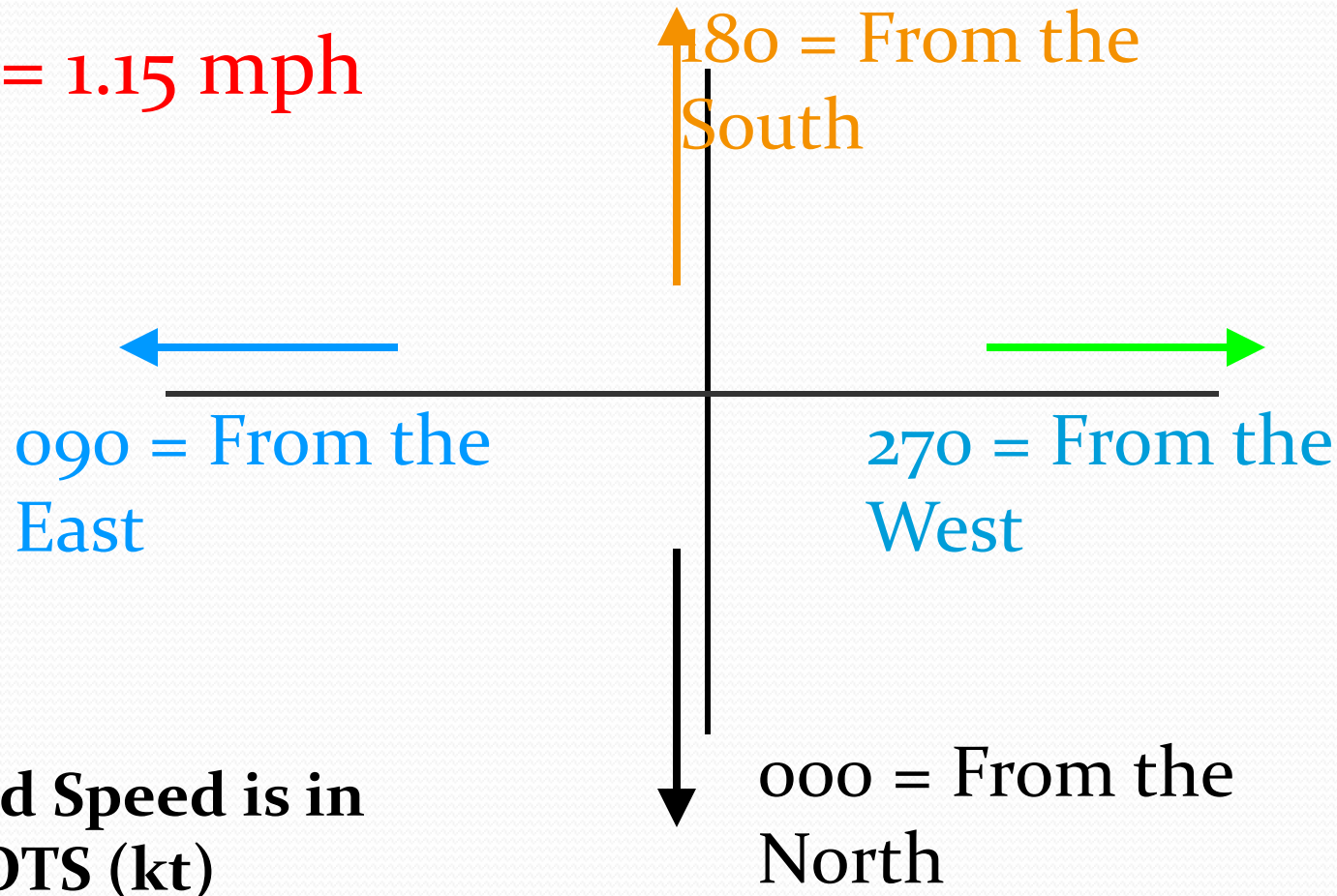
1200Z = 8:00 AM in Miami

1500Z = 11:00 AM CST in Michigan

0600Z = 12:00 PM PST in California

# Meteorology Wind Direction

1 kts = 1.15 mph



# GSF = Short-Range GFS (Global Forecast System)

GFS MOS (MAV)

KMIA GFS MOS GUIDANCE 2/16/2011 0600 UTC

DT /FEB 16 /FEB 17 /FEB 18 /

HR 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06

X/N	78	64	78	65	79
-----	----	----	----	----	----

TMP 62 72 76 75 70 69 67 65 65 74 77 76 72 70 68 67 67 75 77 72 69

DPT 57 56 55 55 57 58 58 58 58 58 57 56 57 58 58 58 58 58 58 59 59

CLD SC BK SC SC SC SC FW SC SC SC SC SC FW SC FW FW FW SC SC SC SC

WDR 05 09 10 10 09 09 08 08 07 08 09 09 08 08 08 08 07 08 09 07 08

WSP 02 09 10 09 07 06 05 05 05 10 12 13 10 09 07 05 06 11 12 09 06

P06            2            1            2            4            1            0            2            1            0    1    1

P12                      3                      12                      1                      3                      1

006      0      0      0      0      0      0      0      0      0      0

Q12	0	0	0	0	0
-----	---	---	---	---	---

T06	0/ 0	0/ 0	5/ 0	7/ 0	0/ 1	0/ 0	0/ 0	0/ 0	2/ 0	0/ 4
-----	------	------	------	------	------	------	------	------	------	------

T12	5/ 1	7/ 1	0/ 0	4/ 2	0/ 4
-----	------	------	------	------	------

[illegible]

POS     0   0   0   0   1   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0

[illegible]

CIG 6 8 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 6 8 8

VIS 7

[illegible]

# MOS Abbreviations

- **DT** = The day of the month, denoted by the standard three or four letter abbreviation
- **HR** = Hour of the day in UTC time. This is the hour at which the forecast is valid, or if the forecast is valid for a period, the end of the forecast period.
- **N/X** = nighttime minimum/daytime maximum surface temperatures.
- **TMP** = surface temperature valid at that hour.
- **DPT** = surface dewpoint valid at that hour.
- **CLD** = forecast categories of total sky cover valid at that hour.
- **WDR** = forecasts of the 10-meter wind direction at the hour, given in tens of degrees.
- **WSP** = forecasts of the 10-meter wind speed at the hour, given in knots.
- **Po6** = probability of precipitation (PoP) during a 6-h period ending at that time.
- **P12** = PoP during a 12-h period ending at that time.
- **Qo6** = quantitative precipitation forecast (QPF) category for liquid equivalent precipitation amount during a 6-h period ending at that time.
- **Q12** = QPF category for liquid equivalent precipitation amount during a 12-h period ending at the indicated time.
- **SNW** = snowfall categorical forecasts during a 24-h period ending at the indicated time.
- **To6** = probability of thunderstorms/conditional probability of severe thunderstorms during the 6-hr period ending at the indicated time.
- **T12** = probability of thunderstorms/conditional probability of severe thunderstorms during the 12-hr period ending at the indicated time.
- **POZ** = conditional probability of freezing pcpr occurring at the hour.
- **POS** = conditional probability of snow occurring at the hour.
- **TYP** = conditional precipitation type at the hour.
- **CIG** = ceiling height categorical forecasts at the hour.
- **VIS** = visibility categorical forecasts at the hour.
- **OBV** = obstruction to vision categorical forecasts at the hour.



# MOS - Definitions of Categorical

## MAV Ceiling Height Categories

1	< 200 feet
2	200 - 400 feet
3	500 - 900 feet
4	1000 - 1900 feet
5	2000 - 3000 feet
6	3100 - 6500 feet
7	6600 - 12,000 feet
8	> 12,000 feet or unlimited ceiling

## MAV Visibility (VIS) Categories

1	< 1/2 miles
2	1/2 - < 1 miles
3	1 - < 2 miles
4	2 - < 3 miles
5	3 - 5 miles
6	6 miles
7	> 6 miles

## MAV QPF Categories

0	no precipitation
1	0.01 to 0.09 inches
2	0.10 to 0.24 inches
3	0.25 to 0.49 inches
4	0.50 to 0.99 inches
5	1.00 to 1.99 inches
6	2.00 inches or greater

## MAV Cloud (CLD) Categories

CL	clear
FW	few > 0 to 2 octas
SC	scattered > 2 to 4 octas
BK	broken > 4 to < 8 octas
OV	overcast

## MAV Obstruction to Vision (OBV) Categories

N	none of the following
HZ	haze, smoke, dust
BR	mist (fog with visibility $\geq$ 5/8 mile)
FG	fog or ground fog (visibility < 5/8 mile)
BL	blowing dust, sand, snow

## MAV Snow Fall Amount Categories

0	no snow or a trace expected
1	> a trace to < 2 inches
2	2 to < 4 inches
4	4 to < 6 inches
6	6 to < 8 inches
8	$\geq$ 8 inches

## MAV Precipitation Type (TYP) Categories

S	pure snow or snow grains
Z	freezing rain/drizzle, ice pellets, or anything mixed with freezing precip
R	pure rain/drizzle or rain mixed with snow

# NAM

NAM MOS (MET)

KMIA NAM MOS GUIDANCE 2/16/2011 0000 UTC

DT /FEB 16 /FEB 17 /FEB 18 /

HR	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	03	06	09	12	18	00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

X/N	76	62	78	65	79
-----	----	----	----	----	----

TMP 63 60 59 70 74 74 70 68 66 64 64 72 76 76 72 71 68 67 67 77 72

DPT 50 48 48 49 48 48 49 50 50 49 50 52 53 54 56 57 57 57 57 57 57

CLD CL CL FW FW FW CL CL CL CL CL CL FW FW CL CL CL FW CL FW FW CL

WDR 05 04 08 10 10 09 09 10 12 11 09 11 12 11 10 08 10 09 10 10 07

WSP 02 02 03 11 09 10 08 05 04 03 03 08 09 10 10 06 07 07 05 12 12

P06                    4            3            2            3            4            4            4            0            1    5    4

P12	5	6	6	7	6
-----	---	---	---	---	---

006      0      0      0      0      0      0      0      0      0      0      0

012                  0                  0                  0                  0                  0

[illegible]

T12	0/ 0	0/ 0	0/ 0	0/ 0	1/ 0
-----	------	------	------	------	------

[illegible]

VIS 7

[illegible]

[illegible][illegible]

# GFS Grid Interpolations

Station: KMIA Lat: 25.78 Lon: -80.32 Elev: 8 Closest grid pt: 14.8 km.

Initialization Time: 11-02-14 0600 UTC

PARAMETER/TIME	000	006	012	018	024	030	036	042	048	054	060	066	072
----------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

DAY / HOUR	14/06	14/12	14/18	15/00	15/06	15/12	15/18	16/00	16/06	16/12	16/18	17/00	17/06
------------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

## TEMPS

SFC (2 M) (F)	58	57	71	64	59	56	71	64	64	64	73	68	66
850 MB (C)	11	12	11	10	13	12	11	12	9	7	9	9	9
700 MB (C)	5	5	6	6	6	5	6	5	5	5	5	6	6
500 MB (C)	-15	-15	-13	-12	-11	-11	-12	-11	-11	-11	-11	-11	-9
1000-500 THCK	562	562	563	564	564	563	563	563	564	563	564	564	565

## MOISTURE

30 M AVG RH	66	70	58	59	69	70	59	68	70	71	66	74	77
850 MB DP/RH	-12/19	-13/15	-9/24	-3/41	-19/09	-26/05	-20/09	-25/06	-1/50	6/88	7/89	7/86	7/88
700 MB DP/RH	-31/05	-33/04	-33/04	-32/05	-28/07	-30/06	-30/06	-29/06	-28/07	-29/06	-29/06	-30/06	-31/05
500 MB DP/RH	-37/13	-39/11	-43/06	-48/03	-44/05	-41/07	-40/08	-42/06	-40/07	-38/09	-37/10	-35/12	-40/06
CONV PRECIP (IN)													
TOTAL PRECIP (IN)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00

## WIND DD/FFF (Kts)

30 M AVG	02/005	04/008	07/006	07/008	01/006	01/011	05/011	05/013	07/011	09/012	10/013	08/013	10/014
850 MB	12/004	08/000	31/002	31/007	33/010	03/010	07/007	06/011	09/014	10/014	11/010	08/008	10/010
700 MB	32/006	27/008	27/011	28/013	29/010	29/011	30/011	31/006	29/004	30/007	29/007	30/007	31/007
500 MB	33/015	34/011	31/007	31/018	31/015	32/014	30/010	28/014	28/018	28/018	28/020	30/019	31/016
250 MB	27/062	29/031	30/027	27/027	27/032	28/029	29/029	28/037	28/040	29/039	28/039	28/038	28/039

## VERTICAL VEL (uB/S)

850 MB		-14	11	-24	4	1	-2	-5	5	1	7	-10	3
700 MB		-5	-1	-7	-2	-12	-4	-4	-6	-1	-3	-11	-8
500 MB		-14	-12	-16	-15	-5	0	-12	-4	4	-11	-7	-9

## OTHER

TROP PRES (MB)	96	86	83	87	94	92	92	86	85	90	90	81	88
MSL PRES (MB)	1025	1024	1024	1022	1022	1023	1023	1022	1022	1022	1022	1021	1022
500 MB HGT (DM)	582	582	583	583	583	582	583	582	583	582	583	583	584
500 MB ABS VORT	4.7	4.6	3.5	2.1	4.7	4.9	4.0	4.3	5.0	4.8	4.9	6.3	5.4